

CLAIMS:

1. A method (10) of detecting watermarks in data/signals corresponding to a sequence of images (20), the method (10) including the steps of:
 - (a) accumulating data (50) corresponding to a spatial sub-region (40) of one or more images (30) in the sequence (20), and storing the accumulated data in a first memory (50; 310);
 - (b) performing one or more transformations (60) on the accumulated data (50) to generate corresponding transformed data (70) for storing in a second memory (70; 310);
 - (c) comparing (80, 90) the transformed data (70) stored in the second memory with one or more reference watermarks (100) to determine associated one or more degrees of similarity; and
 - (d) outputting one or more results indicative of whether or not said one or more degrees of similarity exceed one or more defined similarity thresholds, and thereby indicative of whether or not one or more of the reference watermarks are present in the sequence (20) of images (30).
- 15 2. A method according to Claim 1, wherein the spatial sub-region (40) of said one or more images (30) corresponds to a substantially central sub-region (40) thereof.
- 20 3. A method according to Claim 1, wherein comparison in step (c) of said transformed data (70) in the second memory means with said one or more reference watermarks (100) is executed by way of correlation (90).
- 25 4. A method according to Claim 1, wherein said one or more reference watermarks (100) are Hanning-type windows for use in mutually correlating accumulated data from a plurality of watermarked sub-regions present in the sequence (20) of images (30) for watermark detection purposes.
5. A method according to Claim 1, wherein the steps (a) to (d) are executed in one or more of hardware (300) and software in a time division multiplexed manner during

which said one or more of hardware (300) and software is capable of executing other functions.

6. A method according to Claim 1, wherein the second memory (70; 310) is of sufficient memory capacity so that all data elements present in the first memory (50) are mapped in step (b) by said one or more transformations onto corresponding elements in the second memory (70), thereby substantially circumventing loss of information associated with transforming spatially peripheral regions of the accumulated data.
- 10 7. A method according to Claim 1, wherein the first and second memories (50, 70) are arranged to have a capacity corresponding substantially to data associated with the spatial sub-region (40) of the one or more images (30) in the sequence (20)
- 15 8. A method according to Claim 1, wherein the steps (b) and (c) are executed a plurality of times to provide a substantially exhaustive search through the accumulated data in said first memory means within defined searching limits for detecting the presence of one or more watermarks in the accumulated data (50).
- 20 9. A method according to Claim 1, wherein a Hanning-type window (200, 210) is applied to the transformed data (70) stored in the second memory (70; 310) in step (c) before comparing with said one or more reference watermarks (100).
- 25 10. A method according to Claim 1, wherein the one or more reference watermarks (100) are subjected to a Hanning-type window (200, 210) in step (c) for use in comparing with the transformed data (70).
11. A method according to Claim 9 or 10, wherein the Hanning-type window (200, 210) is arranged to have progressively decreasing spatial peripheral extent.
- 30 12. A method according to Claim 1, wherein said one or more reference watermarks (100) are blurred representations of corresponding one or more unblurred reference watermarks.

13. A method according to Claim 1, wherein in step (c) at least one of the accumulated data (50) and the transformed data (70) is subjected to blurring to render comparison with said one or more reference watermarks less sensitive to selection of the inverse transform (60).

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14. A method according to Claim 12 or 13, wherein the method (10) is arranged to employ blurred representations of said one or more unblurred reference watermarks for initially identifying one or more watermarks present in the accumulated data (50), and then subsequently arranged to employ substantially unblurred reference watermarks for analysing the accumulated data (50).

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15. A method according to Claim 1, wherein the spatial region (40) includes a blurred watermark.

15 16. A method according to Claim 1, wherein the data (50) accumulated in step (a) in the first memory (50; 310) is continuously updated as images (30) of the sequence (20) are received, and the steps (b) to (d) are repetitively applied to said continuously updated accumulated data (50).

20 17. A method according to Claim 1, wherein said one or more transformations (60) in step (b) include at least one of translation, rotation, skew, warp, scaling and flip transformations.

25 18. A method according to Claim 1, wherein the method (10) is employed temporally alternately and/or concurrently with one or more conventional watermark detection processes.

30 19. A method according to Claim 18, wherein the method is invoked when said one or more conventional detection processes fail to detect the presence of one or more watermarks in the sequence of images (20).

20. A method according to Claim 1 wherein, in step (a), position of the sub-region (40) from which the data is accumulated from said images (30) is selectable between a

plurality of locations within said images (30), and said one or more reference watermarks (100) for use in step (c) are chosen depending upon which of said locations is selected.

21. A method according to Claim 1 arranged to be executable in one or more of a
5 settop box, a DVD player, a DVD recorder, an MPEG encoder, an MPEG decoder a VWM
marker, and storage device and a display device.

22. A watermark detector (300) for detecting watermarks in data/signals
corresponding to a sequence (20) of images (30), the detector (300) including:
10 (a) accumulating means (50, 310, 350) for accumulating data corresponding to a
spatial sub-region (40) of one or more images (30) in the sequence (20), and a first memory
(50, 310) for storing the accumulated data (50) generated by the accumulating means (50,
310, 350);
(b) transforming means (330, 340, 350) for performing one or more
15 transformations on the accumulated data (50) from the first memory (50, 310) to generate
corresponding transformed data (70) for storing in a second memory (70, 310);
(c) comparing means (340, 350) for comparing the transformed data (70) stored in
the second memory (70, 310) with one or more reference watermarks (100) to determine
associated one or more degrees of similarity; and
20 (d) outputting means (360) for outputting one or more results indicative of
whether or not said one or more degrees of similarity exceed one or more defined similarity
thresholds, and thereby indicative of whether or not one or more of the reference watermarks
(100) are present in the sequence (20) of images (30).

25 23. A detector (300) according to Claim 22, incorporated into one or more of a
settop box, a DVD player, a DVD recorder, an MPEG encoder, an MPEG decoder a VWM
marker, a data storage device and a display device .